**Operations & Maintenance Agreement Considerations for Federal Agency On-Site Wind Energy Projects**

**DISCLAIMER**

This O&M checklist is intended as a resource only. ***It is the responsibility of Government Agency staff to ensure that all procurements follow all applicable federal requirements and agency-specific policies and procedures***. All procurements must be thoroughly reviewed by agency contracting and legal staff and should be modified to address each agency's unique acquisition process, agency-specific authorities, and project-specific characteristics.

**PERSPECTIVE and IMPORTANT NOTES**

This checklist is intended as a resource when drafting an operations and maintenance (O&M) agreement with a third party for the servicing of an on-site, government agency-owned, grid-connected, size-neutral wind turbine in the United States. The considerations list also briefly describes what would be required for an agency’s on-site staff to provide O&M.

This checklist provides considerations for O&M agreements that will help enable project longevity and sustained operation.A broad range of wind turbine sizes can be installed on-site to provide energy for a federal agency. For example, the National Nuclear Security Administration’s Pantex Renewable Energy Project has five 2.3-megawatt (MW) wind turbines, while the U.S. Fish & Wildlife Service’s Missisquoi National Wildlife Refuge project has one 10-kilowatt (kW) wind turbine.

While these considerations are intended to be inclusive of all turbine sizes, the costs, equipment requirements, maintenance, and frequency of O&M practices can vary widely between small (e.g., 10 kW) turbines and large multimegawatt turbines. Regardless of size, a comprehensive wind energy O&M plan is necessary to maximize system production, savings, and overall project life.

Additionally, while the considerations outlined in this checklist can be relevant during a turbine’s warranty period, they are most applicable to a post-warranty O&M agreement. The warranty provided by the original equipment manufacturer (OEM) typically covers the first two to five years of operation, after which a new O&M agreement is established to cover further servicing needs.

**INSTRUCTIONS FOR USING THIS DOCUMENT**

Use this checklist in tandem with Pacific Northwest National Laboratory’s [**O&M Best Practices for On-Site Wind Turbines**](https://www.pnnl.gov/projects/om-best-practices/onsite-wind-turbines),which provides an overview of wind turbine technologies and standard maintenance procedures,and FEMP’s [**Technical Specifications for On-site Wind Turbine Installations**](https://www.energy.gov/femp/articles/technical-specifications-site-wind-turbine-installations)**,** which provides a customizable template for the procurement and installation of a wind turbine.

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# O&M Agreement Type

O&M agreements can be with an OEM, an independent service provider, or O&M can be performed in-house by on-site government agency staff. O&M could also be performed using a combination of these options. In-house staff may perform scheduled maintenance while an agreement with the OEM is retained for larger-scale, unexpected repairs.[[1]](#footnote-1)

Benefits and disadvantages of each O&M agreement type are described in the Table 1.

**Table 1: Overview of O&M Agreement Types[[2]](#footnote-2)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | OEM Contract | Independent Service Provider Contract | In-house O&M |
| Benefits | * Direct access to spare parts
* Direct contact with OEM engineering staff
* Greater credibility for project financing
* Experienced technicians
 | * Customer focused, competitive pricing
* Not limited by OEM directions; could offer more solution options to turbine problems
 | * Optimize costs and savings (maintain control of asset)
* Immediate servicing with on-site personnel (ideal for remote locations)
* A sense of ownership can result in better care
 |
| Disadvantages | * Can be expensive over the long‐term
* O&M is not the core business of an OEM
* O&M service is not typically available from small wind turbine manufacturers ($\leq $100 kW)
 | * May have more difficulty obtaining parts which could result in delayed repairs
* Can have a limited geographical coverage
 | * High investment for on-site staff training, tools, and spare parts
* Can make agency operations more complex because of the added scope of work
* Requires management of a spare parts inventory
 |

# Considerations

1. Scope of Maintenance

Outline the scope of expected maintenance services, that could include scheduled, unscheduled, and predictive maintenance, in your O&M agreement. Define how additional services will be addressed and compensated. Establish fixed charges vs. time-based charges. If desired, establish key performance indicators (KPIs), or metrics to track turbine performance, to inform appropriate maintenance measures. KPIs can also be established to monitor the success of maintenance strategies.

1. Scheduled Maintenance

Define desired frequency for scheduled (preventive) maintenance actions. Preventive maintenance is maintenance that is scheduled in advance to be performed at regular intervals. The minimum frequency is typically outlined by the OEM in the wind turbine owner’s manual. Delineate expected cost and time involvement for scheduled maintenance visits. Include a checklist to follow during scheduled maintenance visits (an example checklist is available in the [O&M Best Practices for On-Site Wind Turbines](https://www.pnnl.gov/projects/om-best-practices/onsite-wind-turbines)).

1. Unscheduled Maintenance

Detail how unscheduled maintenance will be addressed, the desired response time, and estimated costs for unscheduled maintenance. Unscheduled maintenance is maintenance that is performed as needed in response to an unexpected failure or emergency. Unscheduled maintenance may be required after an extreme weather event or upon detection of unsafe turbine operation, such as unexpected noise.

1. Predictive Maintenance

Predictive maintenance is the practice of evaluating the wind turbine through periodic or continuous condition monitoring to estimate the best time to perform maintenance to prevent a failure or performance degradation. If the wind turbine has a predictive, conditions-based monitoring system with remote access monitoring by the OEM, independent service provider, or qualified on-site personnel, include how maintenance for abnormal conditions reports (e.g., excessive vibrations) will be addressed, the desired response time, and expected costs.

1. Terms of Renegotiation

Describe terms and conditions for the renegotiation and/or extension of the O&M agreement contract. Outline terms and conditions for project decommissioning and turbine disposal if the O&M agreement will coincide with end-of-project life. Consider that maintenance costs may increase with contract extension, as the wind turbine ages.

1. Warranty Considerations

If the O&M agreement covers the warranty period, ensure that the types of repairs or modifications that may void a warranty are detailed in order to be avoided.

1. Spare Parts Inventory

For budgeting purposes, include a list of recommended spare parts that could be needed to repair or replace components of the wind turbine during its lifetime, the anticipated times for replacement or repair of key components, the costs of the replacements or repairs with the spare parts, and the minimum acceptable condition of the spare parts (i.e., indicate if refurbished spare parts are acceptable). For example, inverters for small wind turbines may need to be replaced after 10 years of operation. Identify who will store spare parts and dispose of replaced parts.

1. Availability Guarantee

Extensive O&M agreements can contain availability guarantees (i.e., the wind turbine will be operational for 95% of the time that the available wind speeds are sufficient to generate energy). The higher the availability guarantee, the higher the cost of the agreement is likely to be.

1. O&M Provider Obligations

Address O&M provider obligations such as regular O&M service reporting (e.g., monthly, quarterly, annually), security and badging requirements for onsite access, billing and administrative functions, and identifying any special training for on-site personnel needed to monitor the wind turbine.

## Emergency and Safety Plan

Include an on-site emergency and safety plan that includes procedures to follow for events such as high wind speeds, thunderstorms, ice shedding, fire, turbine rotation overspeed, visible loose parts, high vibrations, or unusual noise.

1. An example of a combination approach highlighted in a recent DOE Wind Energy Technologies Office (WETO) case study is the Adams Electric Cooperative [Randy D. Rigg Memorial Wind Turbine](https://www.cooperative.com/programs-services/bts/radwind/Documents/RADWIND-Case-Study-Adams-Electric-April-2023.pdf). Adams Electric Cooperative has an O&M contract with the OEM for major repairs and warranty issues, but otherwise on-site staff conduct most of the standard maintenance and repairs. To perform the maintenance, cooperative staff completed maintenance trainings from the OEM in addition to tower climbing and safety trainings. In contrast, Adams Electric Cooperative has another wind turbine, the [Pigeon Creek Wind Turbine](https://www.cooperative.com/programs-services/bts/radwind/Documents/RADWIND-Case-Study-Adams-Electric-April-2023.pdf), for which it has a full O&M contract with the OEM that includes an availability guarantee. [↑](#footnote-ref-1)
2. Adapted from: <https://japan.ul.com/wp-content/uploads/sites/27/2015/03/7_E-4.pdf> and <http://www.windpowerengineering.com/maintenance/deciding-between-an-isp-and-oem-for-wind-farm-maintenance/> [↑](#footnote-ref-2)